MULTIMEDIA UNIVERSITY

STUDENT IDENTIFICATION NO

MULTIMEDIA UNIVERSITY

FINAL EXAMINATION

TRIMESTER 1, 2019/2020

BDS 2874 – MANAGEMENT DECISION SCIENCE

(All sections / Groups)

12 OCTOBER 2019
9.00 a.m. - 11.00 a.m.
(2 Hours)

INSTRUCTIONS TO STUDENTS

1. This question paper consists of **Five (5)** pages with:
   Section A: Ten (10) multiple choice questions (20%)
   Section B: Three (3) structured questions (80%)

2. Answer **ALL** the questions.

3. Answer **Section A** in the multiple-choice answer sheet provided and **Section B** in the answer booklet provided.

SECTION A: MULTIPLE CHOICE QUESTIONS (20 MARKS)

There are TEN (10) questions in this section. Answer ALL questions on the multiple choice answer sheet.

1. A feasible solution to a linear programming problem
   A. must be a corner point of the feasible region.
   B. must satisfy all of the problem's constraints simultaneously.
   C. need not satisfy all of the constraints, only the non-negativity constraints.
   D. must give the maximum possible profit.
   E. must give the minimum possible cost.

2. In order for a linear programming problem to have a unique solution, the solution must exist
   A. at the intersection of the non-negativity constraints.
   B. at the intersection of a non-negativity constraint and a resource constraint.
   C. at the intersection of the objective function and a constraint.
   D. at the intersection of two or more constraints.
   E. None of the above

3. A constraint with zero slack or surplus is called a
   A. nonbinding constraint.
   B. resource constraint.
   C. binding constraint.
   D. nonlinear constraint.
   E. linear constraint.

4. When a constraint line bounding a feasible region has the same slope as an isoprofit line,
   A. there may be more than one optimum solution.
   B. the problem involves redundancy.
   C. an error has been made in the problem formulation.
   D. a condition of infeasibility exists.
   E. None of the above

5. What is said to exist when total demand equals total supply in a transportation problem?
   A. an equalized problem
   B. an equilibrialized problem
   C. a harmonized problem
   D. a balanced problem
   E. This situation can never occur.

Continued...

6. Critical Path Method (CPM)
   A. assumes we do not know ahead of time what activities must be completed.
   B. assumes that activity time estimates follow the normal probability distribution.
   C. is a deterministic network technique that allows for project crashing.
   D. is a network technique that allows three time estimates for each activity in a project.
   E. None of the above

7. A pessimistic decision making criterion is
   A. maximax.
   B. equally likely.
   C. maximin.
   D. decision making under certainty.
   E. minimax regret.

8. What is the range of the Hurwicz criterion coefficient of realism α?
   A. 1 to 100
   B. 1 to 10
   C. 0 to 10
   D. 0 to 1
   E. -1 to 1

9. In making inventory decisions, the purpose of the basic EOQ model is to
   A. minimize carrying costs.
   B. minimize ordering costs.
   C. minimize the sum of carrying costs and ordering costs.
   D. minimize customer dissatisfaction.
   E. minimize stock on hand.

10. Which of the following is not an assumption for the basic EOQ model?
   A. Only an integer number of orders can be made each year.
   B. Quantity discounts are not possible.
   C. Inventory receipt is instantaneous (all at once).
   D. With orders placed at the correct time, there will be no shortages.
   E. Demand is known.

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SECTION B: STRUCTURED QUESTIONS (80 Marks)

There are THREE questions in this section. Candidates MUST answer ALL THREE questions.

QUESTION 1 [30 Marks]

a) Ayob Company produces oil filters in plants located at towns A, B and C. The oil filters are sent to warehouses at different locations U, V and W. The plants at A, B and C produce 500, 400 and 300 oil filters respectively each week. Warehouses U, V and W require 300, 550 and 350 oil filters respectively. The shipping costs (in RM) vary as given in the following table.

From	To		
	U	V	W
A	5	4	6
B	3	5	4
C	6	3	3

Formulate an initial feasible solution to the transportation problem, by using the Northwest Corner Method. Then evaluate each unused shipping route by computing all improvement indices using Stepping Stone Method.

[15 marks]

b) A tourism company has a van at each of four depots D1, D2, D3 and D4. Tourists staying in four hotels A, B, C and D require a van each and the distance (in km) between the depots and the towns are given in the following table. How should the vans be assigned to the customers so as to minimise the total distance travelled? Use Hungarian Method.

	Depot			
Hotel	D1	D2	D3	D4
A	28	22	11	15
B	12	16	8	8
C	24	15	15	19
D	17	8	14	21

[15 marks]

Continued...

QUESTION 2 [25 Marks]

A project has the following activities, immediate predecessors and activity times.

Activity	Weeks			Immediate Predecessors
	Optimistic time, *a*	Most likely time, *m*	Pessimistic time, *b*	
A	7	9	11	-
B	5	7	9	A
C	2	3	4	A
D	9	11	13	B
E	7	9	11	C, D
F	9	10	11	E
G	6	7	8	F
H	12	13	14	F
I	4	5	6	G, H

a) Construct a network diagram for this problem. **[6 marks]**

b) Determine the expected time, variance, Earliest Start time (ES), Earliest Finish time (EF), Latest Start time (LS), Latest Finish time (LF) and slack for each activity. **[13 marks]**

c) Determine the critical path to complete the project. **[2 marks]**

d) Calculate the variance and the expected completion time of the project. **[4 marks]**

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QUESTION 3 [25 marks]

Kay Company is considering several alternative development projects. The financial success of these projects depends on market conditions. The projects and their four-year financial returns (in RM millions) with the market conditions are shown in the table below.

Alternative	Market, Returns (RM in millions)		
	Good Market	Average Market	Poor Market
Shop	66	32	-15
Apartment	44	33	5
Condominium	55	27	-14
Warehouse	26	15	10

a) Determine the best investment, using the following decision criteria:

i) Maximax **[3 marks]**
ii) Maximin **[3 marks]**
iii) Equal Likelihood **[4 marks]**
iv) Hurwicz criterion of realism ($\alpha = 0.8$) **[4 marks]**
v) Minimax regret criterion **[5 marks]**

b) For the data in part a), the probabilities of good market, average market and poor market are 0.4, 0.5 and 0.1 respectively.

i) Construct an expected opportunity loss (EOL) table. **[4 marks]**
ii) Using minimum EOL as the decision criterion, determine the best alternative. **[2 marks]**

End of paper.